

REMARKS

Applicant has carefully reviewed and considered the Office Action mailed on September 13, 2004, and the references cited therewith.

Claims 17-45 are now pending in this application, although claims 20, 22, 24, and 26-45 are withdrawn from consideration.

Objection to the Drawings under 37 CFR §1.83(a)

The Office Action has maintained an objection to the drawings. (Office Action at page 2). Applicant has submitted a petition with this amendment to seek repose to the Examiner's objections.

The Office appears to assume that the scope of claim 18 requires six metallization layers present always, e.g. "the *uppermost* metal layer M6" (Office Action at page 5, emphasis in original). This assumption is in error and should be withdrawn.

The Office Action exhibits development of a unique, imaginative, and obscure meaning for claim 18 that is not disclosed or intended. This unique meaning has grown to "it is not conventional to somehow form a contact pad *below* other metal layers." (*Ibid.*, emphasis in original). Under this unique meaning developed by the Office, the objection might be meritorious. Applicant, however, considers the plain meaning, as supported by the figures and claim 18, not to be part of this unique meaning that has been developed by the Office.

Claim 18 describes no such unique meaning, nor does the balance of Applicant's disclosure. If the upper metallization were to be an M1, claim 18 covers this limitation. If the upper metallization were to be an M2, claim 18 covers this limitation, etc. That Applicant did not illustrate any metallization because they are conventional, supports the plain meaning of claim 18. Withdrawal of the objection is respectfully requested.

Objection to the Drawings under 37 CFR §1.83(a)

The Office Action has maintained an objection to the specification. Applicant's counsel may have misread the objection in the previous Office Action, and inadvertently responded to limitations of claim 17. This inadvertence is regrettable. The objection to claim 18, however,

should be withdrawn because the Office should withdraw its unique characterization of claim 18, as set forth above. Withdrawal of the objection is respectfully requested.

§103 Rejection of the Claims

Claims 17, 19, 21, 23 and 25 were rejected under 35 USC § 103(a) as being unpatentable over Agarwala et al. (U.S. 5,376,584) in view of Yi et al. (U.S. 6,348,730). Applicant respectfully traverses the rejection and requests the Office to consider the following.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (M.P.E.P. § 2143 8th Ed.).

The Office Action admits that Agarwala '584 does not indicate the nature of a phased metal layer includes "first and third layers of substantially the same metal and the second and fourth metals of substantially the same metal." (Office Action at page 5). The Office Action looks to Yi '730 to remedy this deficiency. The statements in the Office Action regarding the teachings of Yi, however, are in error.

The combination of Agarwala with Yi does not teach all the limitations of claim 17. The Office dismisses out of hand (Office Action at page 7) Yi's teaching at column 3, lines 5-14, which states in pertinent part,

a first metal layer, a third metal layer and a phased layer therebetween. The phased layer includes second and fourth metal layers made of the same material as the first and third metal layers, respectively

(Yi at column 3, lines 5-14). Yi's second and fourth metal layers are necessarily the same as Yi's first and third metal layers. In Yi, this means chromium on chromium and copper on copper, and this cannot be construed to teach the limitations of claim 17. Yi's teaching is verified in Yi's

FIGs. 9 and 10. For example, Yi invariably teaches Cu 55, which is Yi's "third metal layer", touches only Cu 155, which is Yi's "fourth metal layer", and Cr 51, which is Yi's "first metal layer", touches only Cr 151, which is Yi's "second metal layer". The same applies to FIG. 10. Although Yi's names: "first", "second", "fourth", and "third" are normally used as sequentials, Yi's third metal layer 55 is last in sequence of four metals, and consequently Yi's "third" metal layer is the fourth in sequence.

Claim 17 requires in pertinent part "forming a refractory metal fourth layer above and on the refractory metal third layer, wherein the refractory metal fourth layer is substantially the same metal as the refractory metal second layer . . ." The Office cannot construe Yi's fourth metal layer 155 (Cu) to be above and on Yi's third metal layer 55 (Cu), while asserting Yi's fourth metal layer 155 (Cu) to be substantially the same metal as Yi's second metal layer 151 (Cr). Withdrawal of the rejection is respectfully requested.

When one applies the teaching of Yi to Agarwalla, one does not reach what is claimed. Further, the motivation to combine Yi with Agarwalla, in view of what they actually teach, comes only from Applicant's disclosure. Withdrawal of the rejection is respectfully requested.

The Office Action at page 7, continues to mischaracterize Yi's teachings by referring to sequences "first, third, fifth, etc. metal layer (each designated as 151) . . . and second, fourth, sixth, etc. metal layer (each designated as 155) to be of the same metal." (Office Action at page 7). But this is not correct. As set forth above, Yi teaches only first, second, fourth, and third metal layers, and invariably only in that order. Further, Yi invariably teaches the third metal layer 55 is above and on the fourth metal layer 155. Withdrawal of the rejection is respectfully requested.

The Office Action errantly asserts that "Yi teaches that a *phased metal layer is composed of alternating layers of two different metals* and consequently explains to one of ordinary skill what the phased metal layer of Agarwalla is likely to look like and how it may be made." (Office Action at pages 6 and 7, emphasis added).

But this is not correct. Yi never teaches "alternating layers of two different metals" (Office Action at page 6). Yi teaches in great detail, several layers of identical metal, alternated by several layers of a different metal. Yi teaches

in further detail, eight chrome layers 151, two copper layers 155, seven chrome layers 151, three copper layers 155, six chrome layers 151, four copper layers 155, five chrome layers 151, five copper layers 155, four chrome layers 151, six copper layers 155, three chrome layers 151, seven copper layers 155, two chrome layers 151, eight copper layers 155, are deposited in sequence.

(Yi at column 4, lines 42-49). Consequently, Yi teaches some 70 metal layers are formed in a sequence. The Office also characterizes these 70 or so metal layers of Yi as a single metal layer. (Office Action at page 7). This assertion should be withdrawn. Yi teaches second and fourth metal layers being between first and third metal layers, the first and second are the same, and the third (above and on) and fourth (below and on) are the same. (Yi, at column 3 as set forth above). Withdrawal of the rejection is respectfully requested.

The Office next asserts "Yi does teach that the third metal layer is in direct contact with the second metal layer and the that fourth metal layer is in direct contact with the third, etcetera, in any phased metal layer." (Office Action at pages 7 and 8). This mischaracterization of what Yi teaches has been dealt with above, and the rejection should be withdrawn.

The Office Action concludes with a recitation of some limitations of claim 17, in particular asserting "Applicant appears to be arguing a limitation absent in Li which is not presently claimed." (Office Action at page 8). As set forth above, Applicant respectfully asserts Yi does teach a feature that does not match the limitation of claim 17. Withdrawal of the rejection is respectfully requested.

Because the cited references when combined, do not teach or suggest all the claim limitations, withdrawal of the rejection is respectfully requested.

Applicant notes that claims 19, 21, 23, and 25 depend from claim 17 and include other limitations. The combined teachings of Agarwala '584 with Yi, fail to teach all the limitations of these claims as set forth above. Because the cited references when combined, do not teach or suggest all the claims' limitations, withdrawal of these rejections is respectfully requested.

Claim 18 was rejected under 35 U.S.C. §103(a) as being unpatentable over Agarwala et al. (U.S. Patent No. 5,376,584) in view of Yi et al. (U.S. Patent No. 6,348,730 B1) as applied to claim 17 above, and further in view of Microelectronics Packaging Handbook, Semiconductor

Packaging, Part II, 2nd edition, Tummala et al. eds., Kluwer Academic Publishers: Boston, 1997, pp. 132-139. Applicant respectfully traverses the rejection and requests the Office to consider the following.

The deficiencies of Agarwala '584 and Yi as set forth above are incorporated herein by reference. The Office Action cites to Tummala et al. eds., to teach "that it is notoriously well known (1) for the bonding pad to be copper (p. 137, last paragraph, and Fig. 8-6 on p. 138), as well as (2) for the bond pad to attach to one of the metallization layers (the third metallization layer as shown in Fig. 8-2, on p. 133). The Applicant agrees in principle, but not in the instance of Tummala. Tummala illustrates a no-bond pad metallization; the 2.3 micron Al-4% Cu in direct contact with a Cr layer. Because all the claim limitations are not taught by the cited references, withdrawal of the rejection is respectfully requested. Referring again to the rejection of claim 18, Applicant notes that Tummala et al. eds., does nothing to remedy the failure of Agarwala '584 and Yi to teach what is claimed in claim 17, from which claim 18 depends.

Because the cited references when combined, do not teach or suggest all the claim limitations, withdrawal of the rejection is respectfully requested.

RESPONSE UNDER 37 CFR § 1.116 – EXPEDITED PROCEDURE

Serial Number: 09/961036

Filing Date: September 21, 2001

Title: DUAL-STACK, BALL-LIMITING METALLURGY AND METHOD OF MAKING SAME

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Conclusion

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney, John Greaves, at 810-278-9171, or Applicant's below-named representative, at 612-349-9592 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

MADHAV DATTA ET AL.

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Date Dec. 13, 2004

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CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Mail Stop AF, Commissioner of Patents, P.O.Box 1450, Alexandria, VA 22313-1450, on this 13th day of December.

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IN THE DRAWINGS

The drawings have not been amended herein, but a petition has been submitted to seek repose to the Examiner's objections.